

$$f(x) = \frac{x^3}{x^2 - 4}$$

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$$Z = x^3 \quad N = x^2 - 4$$

$$Z' = 3x^2 \quad N' = 2x$$

$$\begin{aligned} f'(x) &= \frac{3x^2 \cdot (x^2 - 4) - x^3 \cdot 2x}{(x^2 - 4)^2} \\ &= \frac{3x^4 - 12x^2 - 2x^4}{(x^2 - 4)^2} \\ &= \frac{x^4 - 12x^2}{(x^2 - 4)^2} \\ &= \frac{x^2(x^2 - 12)}{(x^2 - 4)^2} \end{aligned}$$